



BEYOND THE EXHIBITS

North Carolina Museum of History

North Carolina Coastal Region

What makes the Coastal Plain region of North Carolina unique? The Lost Colony, pirates, lighthouses, the land, and the sea are part of the Coastal Plain's history. Learn how geography played a primary role in early settlement and in the development of the culture, traditions, and experiences of coastal residents. Discover the region's important people and events.

In this educational packet:

- Read "Wish You Were Here: The Coastal Plain" from the Fall 2018 issue of the *Tar Heel Junior Historian* Magazine.
- Review the "Why is the Coastal Plain Unique?" guide.
- Using our "Lighthouse" craft page, create your own!
- Watch "[Tales from the Queen Anne's Revenge: LIVE!](#)" In the summer of 1718, the pirate Blackbeard ran his flagship *Queen Anne's Revenge* aground near Beaufort. Blackbeard and his crew were unhurt and abandoned the ship, taking with them everything they thought was valuable. But, for those of us who are enamored with 18th-century ships, pirates, and colonial history, plenty of treasure remains!
- Read "Underwater Conservation" from the Spring 2018 issue of the *Tar Heel Junior Historian* Magazine to learn more about the Conservation process.
- Now that you know all about pirates, design your own pirate flag.

Wish you were here!

The Coastal Plain

by George Willoughby



Fast Facts

Location: eastern part of the state

Number of counties: 41

Largest city: Fayetteville (population: 204,759)

Average temperatures: 56°F winter, 90°F summer

Size: 21,000 square miles

Geographical fact: often divided into two parts—the Outer Coastal Plain and the Inner Coastal Plain

Soil: sand and clay

Dominant feature: wetlands

Known for: farming, beaches, lighthouses, barrier islands, Dismal Swamp, pirates, shipwrecks, Pepsi Cola, seafood, barbecue

Weird fact: only place in the world where Venus flytraps grow naturally

The waters off the North Carolina coast are known as the Graveyard of the Atlantic. A claim of up to 5,000 shipwrecks means this nickname is one that is certainly deserved. However, the importance and the history of our coast go much deeper.

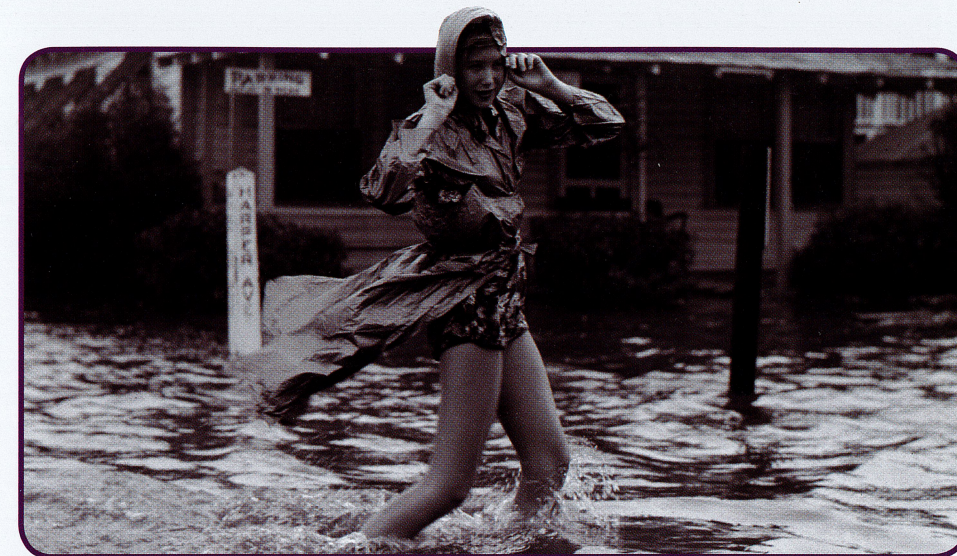
The same coast that you can visit on your family vacation was also visited hundreds of years ago by European explorers traveling around the world! In 1524, Giovanni da Verrazzano was sailing in search of a route to the Pacific Ocean but instead found the Cape Fear area of North Carolina and the Pamlico Sound. Sir Walter Raleigh later founded the Roanoke Colony on Roanoke Island in 1585. Though it failed, Sir Walter Raleigh's sponsorship of the Roanoke Colony led to the capital of North Carolina being named after him more than 200 years later. The mysterious disappearance of the "Lost Colony" still inspires stories to this day!

The age of pirates brought about another legend of North Carolina. Pirates ruled North Carolina waters around the late 17th and early 18th centuries. Pirates could use small coastal communities as hideouts, markets for their pirated goods, areas to repair their ships, and a haven to rest from the sea. This period saw the rise of cities like Bath and New Bern. In 1766 New Bern became North Carolina's first permanent capital.

The Governor's Palace and gardens at Tryon Palace, along with other historical buildings, and the new North Carolina History Center are all great sights to see in New Bern. Bath was North Carolina's first town and later the home of Blackbeard, the notorious pirate. In 1718, 300 years ago, Blackbeard ran his ship, *Queen Anne's Revenge*, aground on a sandbar near Beaufort.

Queen Anne's Revenge is just one of the many ships that came to rest in the Graveyard of the Atlantic. The Civil War, World War I, and World War II all brought action to North Carolina. The coast was vital to Civil War blockade runners—light ships used to get supplies past Union forces.

Coming from Wilmington, the blockade runners were successful with the protection of the guns of Fort Fisher. However, not all blockade runners were unscathed. The *Modern Greece* ran aground while speeding away from the USS *Cambridge* toward Fort Fisher. It ran aground only a half mile away from the fort and was then sunk by the fort's guns to avoid the capture of its cargo. The Graveyard has also captured the USS *Monitor*—the United States' first ironclad ship. Though it was suited for river travel, the USS *Monitor* was traveling along the coast for action in Wilmington but ran into storms near Cape Hatteras and sank.



Earth, wind, water, and sky come together in beautiful ways at the beach. But dramatic weather has always helped shape our history here. On the morning of October 15, 1954, Hurricane Hazel—one of the most destructive hurricanes in US history—slammed into the North Carolina coast. In 2018 Hurricane Florence rivaled Hazel's impact. Above: A young woman wades through deep water at Carolina Beach following Hazel. Image © North Carolina Collection, University of North Carolina at Chapel Hill Library. Below right: Cape Hatteras Lighthouse is a symbol of North Carolina tourism. In 1999, after much public debate, the National Park Service moved the lighthouse to save it from beach erosion and encroaching seas. Image courtesy of the Library of Congress. Bottom: One of the Graveyard of the Atlantic's many shipwrecks, exposed on the beach at Nags Head. Image courtesy of the North Carolina Museum of History.

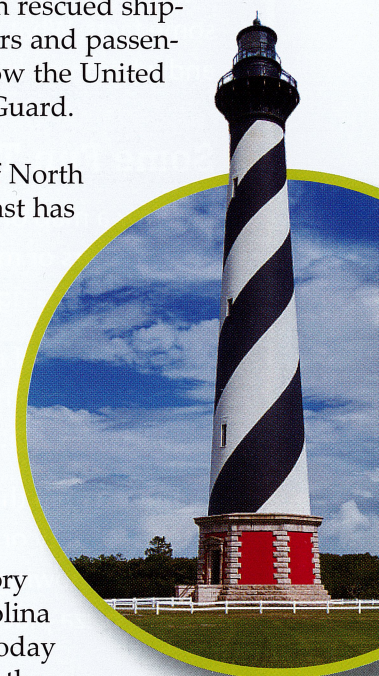
In World War I and World War II, German U-Boats were very active off of North Carolina's Outer Banks. In World War I, U-Boats sank 10 ships in a show of the German naval might. But in World War II, the attacks were more frequent and had an intended purpose—to cut off the supply line to soldiers in Europe. During this time, the waters off of the Outer Banks became known as "Torpedo Junction" because of the large number of ships that were being attacked.

Though the history of North Carolina's coast sounds dangerous and ominous, it has also led to advancements that are extremely beneficial. Early shipwrecks led to the establishment of the many iconic lighthouses along the coast. The dangerous seas also led to the creation of the United States Life-Saving

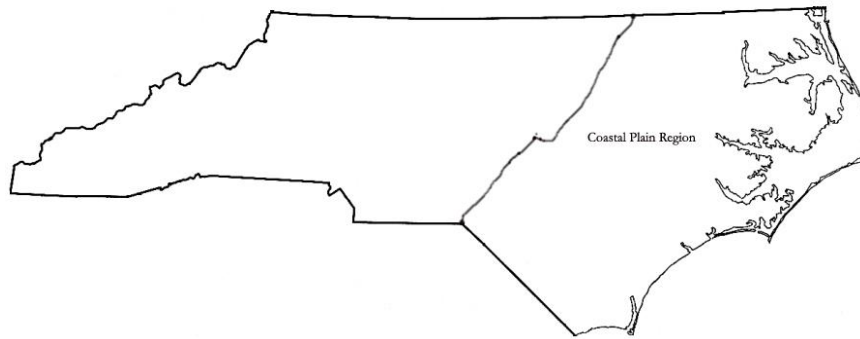
Service, which rescued shipwrecked sailors and passengers and is now the United States Coast Guard.

The history of North Carolina's coast has created many wild legends about the stories of the past. The stories of the Lost Colony, Blackbeard and other pirates, and the naval history of North Carolina are still told today and influence the cultures of North Carolina and the East Coast. If you would like to learn more about the maritime history of North Carolina, be sure to visit one of our state's regional museums in Hatteras, Beaufort, and Southport! 🌸

George Willoughby is a senior at North Carolina State University studying history and journalism. In 2018 he was an intern at the NC Museum of History in Raleigh, where he assisted with the museum's summer camps.



Why is the Coastal Plain Unique?



Location & Land Features

- The Coastal Plain, the state's easternmost region, borders the Atlantic Ocean. It stretches inland 150 miles at its widest point and encompasses 21,000 square miles. The Coastal Plain makes up approximately 45 percent of North Carolina's land area.
- The Coastal Plain's western boundary is formed by the fall line, an imaginary line that indicates where the Roanoke, Tar, Neuse, and Cape Fear rivers fall from the hills of the Piedmont to the flatland of the Coastal Plain.
- The Coastal Plain is flat and ranges in elevation from sea level to approximately 400 feet above sea level.
- The region's fertile soil—primarily sand, clay, and sandstone—is lacking in minerals, and few rocks are present. It is easy to cultivate. Many early European settlers in this region became farmers, cultivating large amounts of acreage.

Climate

- The Coastal Plain has an average temperature of 62 degrees. Prevailing winds from the Atlantic Ocean prevent extreme temps. Winters and summers are usually mild.
- The region receives an average of 48 inches of rainfall per year, although drought often occurs in June, July, and August. From June through November each year, hurricanes are a threat to North Carolina's coast.

Subregions

- The Coastal Plain is divided into the Tidewater and the Inner Coastal Plain. The Tidewater extends inland anywhere from 30 to 80 miles, according to the land's elevation. It includes the Outer Banks, a chain of barrier islands stretching 175 miles in length. The Tidewater, thus named because ocean tides have an impact on this section of the Coastal Plain, is approximately 30 feet above sea level. As the tide comes in, the water level rises and salt water flows into coastal rivers; as the tide goes out, the water level falls.
- The Inner Coastal Plain extends from the Tidewater to the fall line. On its southwestern edge is the Sandhills, a large, hilly, sandy area that covers portions of Richmond, Moore, Hoke, Cumberland, Harnett, Montgomery, Scotland, and Lee counties. The Sandhills area is known for the resort towns of Southern Pines and Pinehurst and their numerous golf courses.

Coastal Waterways and Landforms

- North Carolina's barrier islands are separated from the mainland by shallow bodies of water called sounds. The largest sound is Pamlico. Other sounds are Albemarle, Croatan, Roanoke, Currituck, Bogue, and Core.
- Major islands on the Outer Banks are Bodie Island, Hatteras Island, and Ocracoke Island.
- Pointed bodies of land, known as capes, extend into coastal waters. The three capes in North Carolina are Cape Hatteras, Cape Fear, and Cape Lookout.
- Sand dunes ranging in height from 2 feet to over 100 feet are found on the coast. Jockey's Ridge on the Outer Banks is the highest sand dune.

Inlets

- To reach the ocean from the sounds, ships and other vessels must travel through narrow passages of water, called inlets. Storms, hurricanes, and the shifting sands of the Outer Banks can cause these inlets to fill with sand and silt. Navigation through them has proven difficult throughout history.
- Many inlets have been opened and closed by storms over the past 500 years. Ocracoke Inlet, a deepwater inlet south of Ocracoke Island, was open when the first English colonists arrived in 1585. Currituck, Roanoke, and Hatteras inlets proved unreliable by the early 1700s, and all of them had closed by the late 1700s.
- Ocracoke Inlet became the gateway to northeastern North Carolina and the Albemarle and Pamlico sounds in the colonial period. Colonists and merchants relied on this inlet for trade and transportation. More than 1,400 steamships traveled through Ocracoke Inlet as they journeyed between New Bern and New York in 1836–1837.
- Oregon and Hatteras inlets were created after a hurricane struck North Carolina's coast in 1846. This same hurricane damaged Ocracoke Inlet, and by 1861 the inlet was no longer significant in coastal transportation. Hatteras Inlet, which is wide and shallow, remains important to commercial fishermen on the Outer Banks. Oregon Inlet serves as the gateway to the port at Morehead City.
- Dredging—removing sand or other sediment from a body of water—keeps channels navigable. Reopening inlets and dredging harbors are costly but necessary for navigation.

Inland Waters

- All of North Carolina's natural lakes are located in the Coastal Plain region. The largest is Lake Mattamuskeet, which covers 30,000 acres. Other significant natural lakes are Phelps Lake, Lake Waccamaw, White Lake, Black Lake, and Alligator Lake.
- Numerous rivers are located in the Coastal Plain, including the Chowan, Roanoke, Tar-Pamlico, Neuse, and Cape Fear. The Cape Fear River empties directly into the Atlantic Ocean; the other large rivers empty into sounds.
- The Coastal Plain has a number of swamps. Many acres of swampland were drained in the 20th century. Loblolly pine trees were planted by major lumber industries in the 1970s in these drained swamplands and harvested for wood products. Row crops were also planted in these areas by major agricultural corporations. Due to North Carolina's wetland regulations, the drainage of swampland has decreased in the 21st century.
- The Great Dismal Swamp lies in northeastern North Carolina (and southeastern Virginia). Man-made drainage canals have made the swamp much smaller than it was when the first Europeans arrived. The Big Savannah Swamp is located east of the Cape Fear River.

Forests

- North Carolina's maritime forests are located near the ocean, behind sand dunes, on the sound side of the Outer Banks or on barrier islands. Trees in maritime forests must have a tolerance for sandy soil, salt spray, and strong ocean winds. Species of salt-tolerant trees found in the state's maritime forests include live oak, wax myrtle, red cedar, and yaupon holly.
- North Carolina has a lot of pine trees. The sap of pine trees was made into naval stores—tar, pitch, turpentine, and rosin—beginning in the colonial period. These products were used in waterproofing and preserving wooden sailing ships. The production of naval stores became a very big industry in the Coastal Plain. Collecting pitch and tar was a sticky, hot, smelly job. The nickname "Tar Heel" originated in the naval stores industry.
- The Croatan National Forest covers areas of Craven, Carteret, and Jones counties. Bordered by the Neuse River, the Bogue Sound, and the White Oak River, the forest includes coastal and inland swamp habitats with thick underbrush. The forest's 159,886 acres hold many different trees and plants, including loblolly pine, dogwood, black walnut, bald cypress, American beech, and various oaks.

Flora

- Trees native to the Coastal Plain include longleaf pine, bay, oak, sassafras, and loblolly pine.
- Strawberries, red mulberries, blackberries, huckleberries, blueberries, and elderberries are native to the Coastal Plain.
- Examples of flora found on the Outer Banks include gaillardia, dotted horsemint, hypericum or St. John's wort, yaupon, loblolly bay, swamp mallow, and yellow jessamine. Several varieties of iris are native to the Coastal Plain.
- The exotic Venus flytrap, an insect-eating plant, is found in the Coastal Plain.

Fauna

- When the first European settlers arrived, a large variety of wildlife flourished in the Coastal Plain. Elk, buffalo, black bear, and deer were abundant. Small game such as squirrels and rabbits were also plentiful. Passenger pigeons were so abundant that they darkened the sky when they flew over an area. Elk and buffalo moved west to find open grazing land as settlers moved into the area. The passenger pigeon has been extinct since the early 1900s, due to the popularity of hunting as a sport and the use of guns that could kill dozens of birds with one shot.
- European settlers were surprised to discover wild ponies on the Outer Banks. These small horses had survived Spanish shipwrecks off North Carolina's coastline and had adapted to the climate and vegetation of the Outer Banks. American Indians occasionally used the ponies as beasts of burden, but never rode them. Today the wild ponies are protected and live near Corolla, on Ocracoke Island, and on Shackleford Banks. The herds are managed to prevent overpopulation; park services permit a small number of the horses to be adopted to keep the herds small enough for the environment. North Carolinians realize the historical significance of these animals and want to protect them to prevent extinction.
- Fish are abundant along the coast of North Carolina and are a valuable resource to commercial fishermen. The most predominant fish are channel bass, sea mullet, tuna, blue marlin, and menhaden. Menhaden are used in the manufacturing of chicken feed and other types of animal feed.

Agriculture

- Early English settlers brought wheat and oats to the colony of Carolina. They learned to plant corn, beans, peas, white potatoes, and sweet potatoes from Native peoples.
- Tobacco became the principal moneymaking crop. Tobacco, lumber, and naval stores were the Coastal Plain region's primary exports. Small amounts of wheat and corn were also exported. North Carolina traded with England, the New England colonies, and the West Indies primarily through its coastal ports.
- Lumber was the second-most-valuable export of the 13 colonies, and North Carolina exported one-seventh of that lumber. Most of its lumber came from coastal forests. All commodities were exported in hogsheads (large barrels). Barrel making, or coopering, was one of the largest industries in North Carolina. In one year's time, 150,000 hogsheads were used to export naval stores and crops. In 1753 North Carolina exported to the West Indies 762,000 barrel staves. In 1764 North Carolina exported 30 million board feet of lumber.
- The plantation crops of rice and indigo were grown in the Cape Fear River valley and exported through the port of Wilmington. The Cape Fear region became the most prosperous in North Carolina.
- Cotton growing increased in the southeastern region of the state following the invention of the cotton gin by Eli Whitney in 1793. The one-person, hand-operated cotton gin could separate the seeds from 50 pounds of cotton in one day. (Before the cotton gin, it took 50 hours of hand labor to separate one pound of cotton from the cotton seed.) This invention increased the need for land and for enslaved African Americans to plant and pick the cotton. Many of the slaves who lived in North Carolina worked on cotton and tobacco farms.

Graveyard of the Atlantic

- The ominous nickname for North Carolina's coastline is the "Graveyard of the Atlantic." More than 600 ships have wrecked off the coast of the Outer Banks in the past 500 years. The names, dates, and locations of many shipwrecks have been identified. Many hundreds more unidentified ships lie at the bottom of the ocean.
- Off the Outer Banks, the Labrador Current's cold waters meet the Gulf Stream's warm waters, and weather conditions are volatile. Hurricanes and storms have led to the loss of many ships in this treacherous location.
- Before ship captains had access to weather-forecasting technology, the absence of wind told them of approaching storms. Sailing ships sometimes had to remain in one location for days when there was no wind, and often they could not get out of the path of storms.
- Shifting underwater sandbars add to the treachery of navigating North Carolina's coastline. Diamond Shoals near Cape Hatteras is the most dangerous of these sandbars.
- Residents of the Outer Banks have come to the aid of shipwreck victims throughout history. Some early residents joined the United States lifesaving stations, which used rowboats to rescue victims from the water. Cargo that washed ashore was salvaged, and the wood from wrecked ships was used to construct houses, barns, and stores. Entire villages shared in these materials.

North Carolina's Lighthouses

In the 19th and 20th centuries, seven lighthouses were built on North Carolina's coast to assist ships in avoiding dangerous waters. Each lighthouse had a unique appearance to enable sailors to tell one from the other during the day.

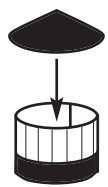
Lighthouse	Year Built	Height	Description
Currituck	1875	162 ft.	Unpainted red brick
Bodie Island	1872	165 ft.	Horizontal black-and-white stripes
Cape Hatteras	1870	208 ft.	Spiral black-and-white stripes
Ocracoke	1823	76 ft.	White
Cape Lookout	1859	165 ft.	Black-and-white diamonds
Oak Island	1958	148 ft.	Black, white, and gray bands
Bald Head Island	1817	90 ft.	Brick coated with cement

Traditional Coastal Lifestyles

- Coastal North Carolinians are traditionally independent people who have developed strong communities. In fact, until the Civil War, many coastal communities—especially on the Outer Banks—were cut off from regular mainland contact. Coastal families relied on each other and passed down traditions and skills that would help them survive in an oftentimes harsh environment.
- Schooling was often unorganized in these hardworking communities. Sometimes parents were fortunate enough to pool their money to hire a tutor for short, irregular periods. John Rolinson taught a four-month term at Hatteras Village in 1847. He charged \$2.50 per student. The rest of the year he fished with everyone else. During the summers, Tom Arendel traveled to Shackleford Banks to teach a two-month semester. His fee was \$20.00 per month.
- Homes were built sturdy and displayed simple construction. On the islands, many homes had removable floorboards that allowed high water to wash through during storms. Of course, most homes and other structures were built on the sound side of the islands. It was considered foolish to build on the ocean side, as we do today.
- While many coastal people generally did not live lavishly or believe in frivolity, they did partake in occasional community dances featuring traditional stringed instruments. Most of the time, musicians from the community played for the crowd. As the region opened up economically, musicians from the “outside” traveled to the area. Also, dance halls began popping up in communities such as Lake Landing in Hyde County. The dance hall known as Barber Shanty played records by artists like Tommy Dorsey and Glenn Miller.
- Coastal people were creative and made the most of their resources, but they could not stop the flood of mainstream influence or commercial development that began with the conclusion of the Civil War.

Traditional Occupations

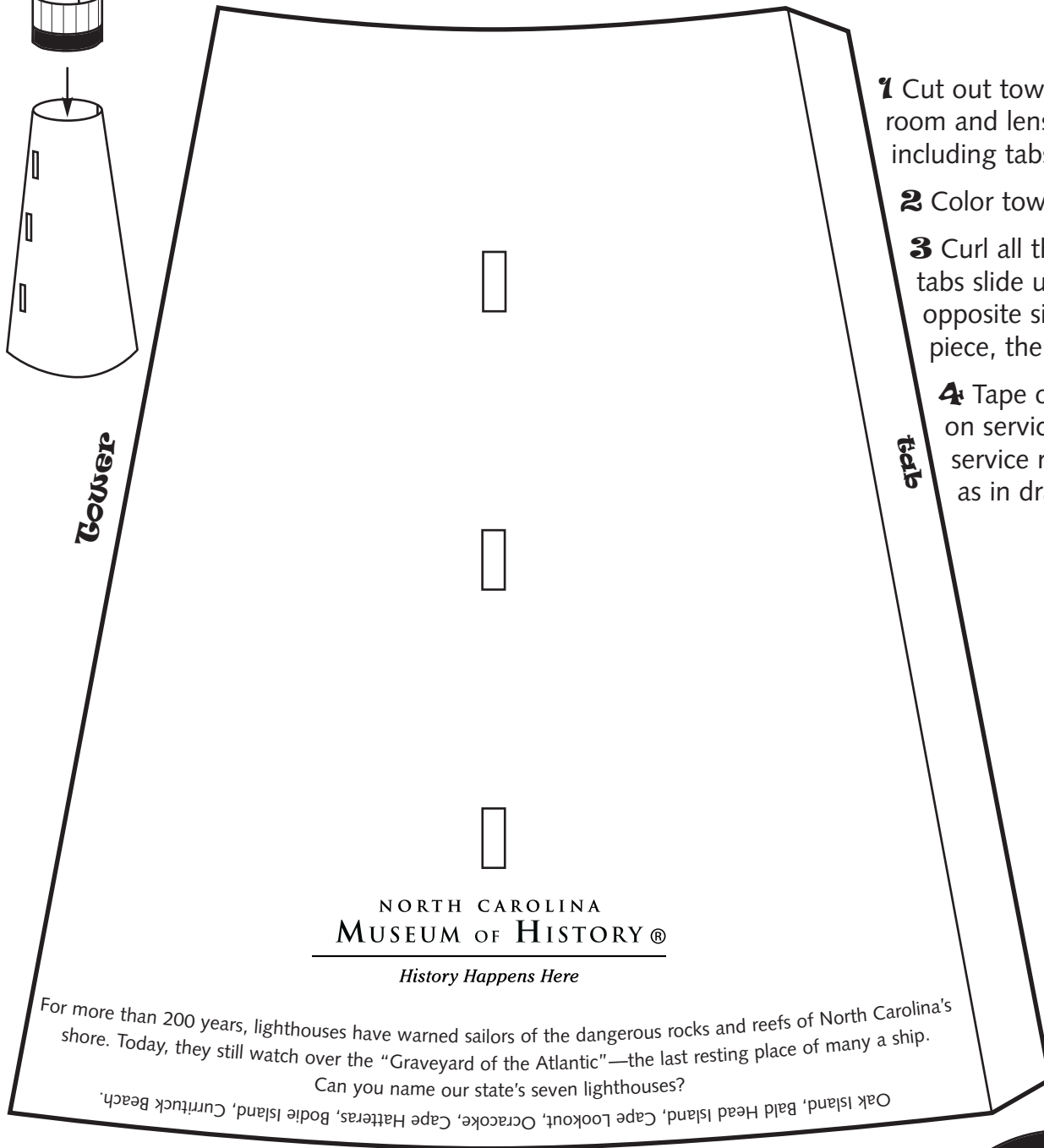
- Coastal families used local natural resources to the best of their advantage. Because they lived near the ocean, these people inherited occupations that bound them to the water. They worked as boatbuilders, fishermen, whalers (until the 20th century), boat pilots, and net makers, and in many other jobs. Youngsters learned to clam, crab, fish, repair boats, hunt waterfowl, and mend nets.
- The Civil War changed the lives of coastal people, just as it affected the rest of North Carolina. Soldiers brought new ideas and perspectives to the coast, along with investors interested in tapping into the region's unspoiled resources. After the war, soldiers and other travelers returned to the region to hunt and fish and to open commercial fisheries, factories, and processing plants. The 1870s brought the region its first large-scale commercial fish and oyster factories that hired for wages. These businesses greatly altered the coastal economy. Occupations that once fostered independent lifestyles evolved into wage-earning jobs that devastated the traditional barter economy.
- Many men and women were attracted to these cash-paying fish-processing factories and surrendered the work traditions of their parents and grandparents. Seine fishing was the most popular employment. Huge nets, manned by dozens of workers, pulled thousands of pounds of fish in a single sweep. Seine fishermen were prominent in the Albemarle Sound, where the Capehart Fisheries alone employed a thousand people during months when shad were plentiful.
- Ducks and other waterfowl have provided a food source for North Carolinians for centuries and a livelihood for many coastal residents. Colonists in North Carolina found that wildlife was plentiful but elusive. American Indians taught the settlers how to make waterfowl replicas to use in hunting. They made these artificial birds, or decoys, by fashioning sticks or rushes into the desired shapes.
- In the 1800s hunters who harvested waterfowl for commercial markets began to craft crude wooden decoys. Carved decoys proved valuable hunting tools, and regional styles of decoy carving gradually developed.
- Market hunting for waterfowl also became a popular business that had devastating effects on North Carolina's coastal ecosystem. Traditional customs and work began to slowly erode as home industry took a backseat to an ever-increasing commercial economy.



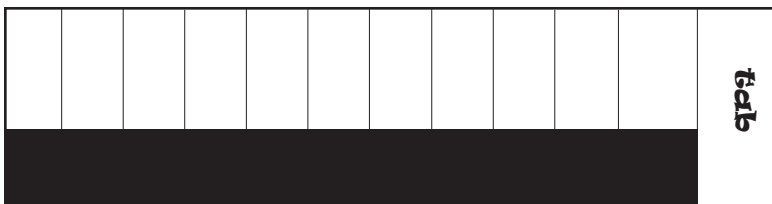
Lighthouse

Supplies

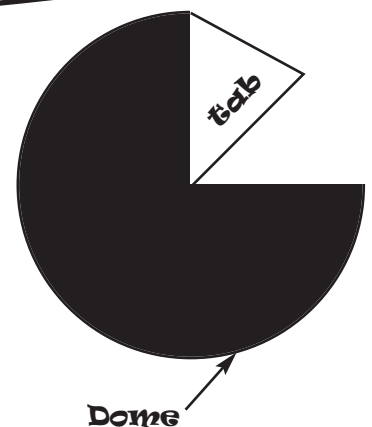
this craft sheet, markers or colored pencils, glue stick, tape, scissors



- 1 Cut out tower, service room and lens, and dome, including tabs.
- 2 Color tower if you'd like.
- 3 Curl all three until the tabs slide under the opposite side of the piece, then glue.
- 4 Tape or glue dome on service room and service room on tower, as in drawing to left.



← Service Room & Lens



STEP 1 X-RADIATION

by Terry Williams



Have you or a friend ever broken an arm? Have you ever gone to the hospital to get an X-ray? It may surprise you to know that the staff at the QAR Conservation Lab also uses X-rays—though in a different way.

The *Queen Anne's Revenge* has been hidden off the coast of North Carolina for almost 300 years. Those years have not been kind, slowly eroding away the organic components and encasing the metals of the ship in **concretion**. This layer of "concrete" or "ugly coral" material must be removed before treatment of the objects within can continue.

To start our work, we use X-radiation to look inside the concretions and identify the artifacts they contain.



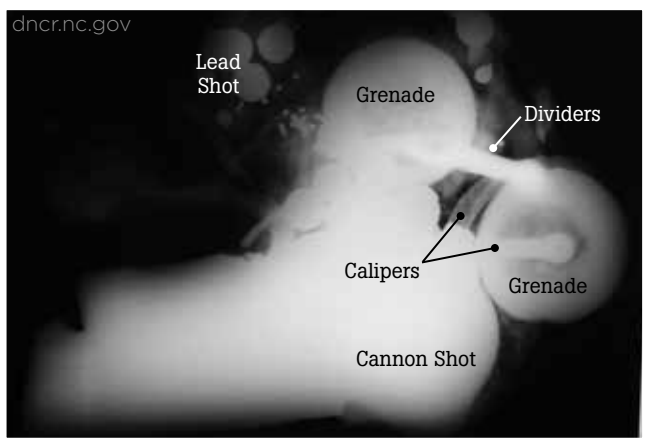
CONCRETION: a hard, solid mass of mineral matter that forms around an artifact over time

In the X-ray process, electromagnetic radiation, or light, is projected toward the object. Some light is absorbed by the object, depending on its density and makeup; the rest is captured below the object and results in exposing the film. At the lab, we manipulate time, energy, power, and the focal point of the transmitting source. Unfortunately, our X-rays only show, reliably, metals—so wood, glass, and textiles will not normally show up in X-ray.

Look at the photos and the objects hidden beneath the concreted surface. If you compare the X-ray to the picture of the concretion, you might have been able to identify the cannon ball (identified here as shot), but the rest is pure mystery. Of note, the cannonballs and grenades are made from the same type of material, but the grenades are hollow to allow for gunpowder, giving them this doughnut appearance. You can sure tell this is a pirate ship from this concretion, can't you?

Since there are so many concretions, conservators look at these X-rays when determining which project to work on next. For example, one conservator is gathering watch components. Another is researching gun carriage assemblies.

In short, X-rays are illuminating!



This X-ray was taken of a concretion (shown on opposite page) before conservation work began. What can you learn from comparing the images? Why did only some of the objects show up? Image courtesy of the NC Department of Natural and Cultural Resources.

Want to learn more about concretion? Check out our "Cookie Concretions!" activity on page 39!



STEP 2 CONCRETION

by Terry Williams

Most of the artifacts of the QAR are surrounded by **concretion**; picture that as ugly coral. Concretions can be small enough to fit in your hand or large enough to cover a cannon—or an anchor. The lab in Greenville has literally thousands of concretions from the QAR shipwreck site.

Conservators begin the process of removing concretion by visually assessing the concretion and its matching X-ray and then determining how to proceed.

If mechanical means are chosen (probably 99.9 percent of the time), the next step is to assemble all required materials. This includes dust collectors, air hoses, and safety gear (see photo below). Pretty comprehensive equipment, right? Among other things, this gear protects our eyes from flying debris, ears from noise, lungs from dust, and beat-up blue jeans from the inevitable muck. Once geared up, the conservator will often use an air scribe—think of it as a small jack-hammer. The air

scribe uses a hard bit or nib and compressed air to remove concretion with precision accuracy. On occasion, larger more percussive methods can be used, but are largely avoided.

The cleaning process can take anywhere from a few hours to a few years, depending on the size, complexity, and fragility of the concreted artifacts. Concretions that contain a single solid iron artifact are going to take much less time to clean, as compared to a concretion like the one pictured at right, which has a multitude of artifact types made up of different materials. The conservator must use a light, careful hand to remove the dense concretion without damaging the artifact underneath, which could be anything from a cannon ball and grenade to copper calipers and ceramics.

Terry Williams served 20 years with the United States Air Force and upon retirement attended the conservation program at City and Guilds of London Art School. After working in various conservation jobs in London, Virginia, and Boston, she returned to North Carolina and began working with the QAR team as an assistant conservator.



Above, top to bottom: These photos show the progression of the concretion breakdown: (1) The initial mysterious blob of concretion. (2) After some of the concretion has been removed. (3) Gradually the artifacts begin to appear. (4) Just one of the artifacts—a set of calipers—that can now be cleaned, studied, and displayed. Left: Conservator Stephen Atkinson dons protective gear to do the fascinating—but messy!—work of removing concretion from an artifact. Images courtesy of the NC Department of Natural and Cultural Resources.





STEP 3 DESALINATION

by Elise B. Carroll

Have you ever been to the beach and, at the end of the day, salt and sand cover everything? Unsurprisingly, after 300 years in the ocean, QAR artifacts are also salty!

The salt from seawater enters most of the artifact through **osmosis**. Even if the artifact's surface appears to be clean, most must remain wet because the artifacts are still very salty. If artifacts dry with salt inside, crystals can grow

and place pressure on the artifact, potentially ruining it. Crystallization can continue to occur after the artifact is dry because of the humidity in the air, particularly in Eastern North Carolina.

Materials such as glass, wood, and ceramic go through a specific type of *desalination*—the process of removing salt. We desalinate artifacts by placing them into progressively less salty water. Through

osmosis, the salt in the artifact slowly leaves the object and goes into the surrounding water until the two equalize. We start desalination in tap water because it is much less salty than seawater.

Each week the water is tested to see if the amount of salt in the water increased or is similar to the previous week's reading. When the reading plateaus, the water is changed, and we begin the testing process again. After the reading is close to that of tap water, the artifacts are placed in reverse osmosis-purified (RO) or filtered water. RO water is regularly found as a type of bottled water in stores. When the artifact's water reads zero salt, it has completed desalination, is safe from salts, and will begin the next part of conservation!

Left: A plastic bin, some rubber gloves, and a TDS (Total Dissolved Salt) meter—tools that ECU student Kelsey Schmitz uses to measure salt in the water. Below: This cast-iron cannonball was not desalinated. Runaway corrosion and physical stresses have caused it to break apart, making it almost unrecognizable. Images courtesy of the NC Department of Natural and Cultural Resources.

Elise B. Carroll is an assistant conservator at the QAR Lab. From Greenville, she began volunteering at the QAR Lab during her undergraduate studies. Completing her undergraduate degree at the University of Mississippi in history and anthropology, Elise returned home to attend East Carolina University's Program in Maritime Studies.



OSMOSIS: a concentrated solution (seawater) goes through a membrane (the surface of the artifact) to a less concentrated solution (inside the artifact) to balance the amount of salt on both sides



STEP 4 BULKING AND CONSOLIDATION

by Karen Martindale

Once the salts are removed, there is more to be done before the artifacts can dry!

The largest organic artifacts—like the wood hull planking—may look like they did when they were made hundreds of years ago. But they are actually very fragile. This is because they have been in water for so long that the water has dissolved and replaced most of the cellular structures that once gave the organic artifacts their shape. If the water dries, the cells collapse, causing the artifacts to shrink, twist, or even crumble!

To dry the artifacts safely, conservators must first replace the water with something denser that can support the artifact during and after drying in a process called bulking. The material used most often is polyethylene glycol, a waxlike substance that is solid at room temperature but can be melted and dissolved in water. You can even find it in everyday products, like lotion and toothpaste.



Conservators Terry Williams, Erik Farrell, Arianna DiMucci, and Michelle Crepeau apply tannic acid to the surface of a cannon. Image courtesy of the NC Department of Natural and Cultural Resources.

Organics aren't the only materials that need a little help to keep looking good. Glass and ceramics are often immersed in or coated with special diluted glues. This process is called consolidation and can help keep brittle or fragile artifacts together.

Though you may not think it, metals are very sensitive to their environment. Moisture and oxygen cause iron to rust (or oxidize) and copper to turn green. So one of the last conservation steps for metals is to paint on protective coatings. Copper is coated with a layer of special diluted glue. Because iron is so vulnerable to rusting, it gets two coatings: tannic acid (which as a side effect gives the iron a black surface) and wax or diluted glue.

Karen Martindale is a conservator at the QAR Lab. She earned her MA at Texas A&M University, where she helped excavate and conserve artifacts from shipwrecks in Sri Lanka, the Gulf Coast of Texas, and Savannah, Georgia.



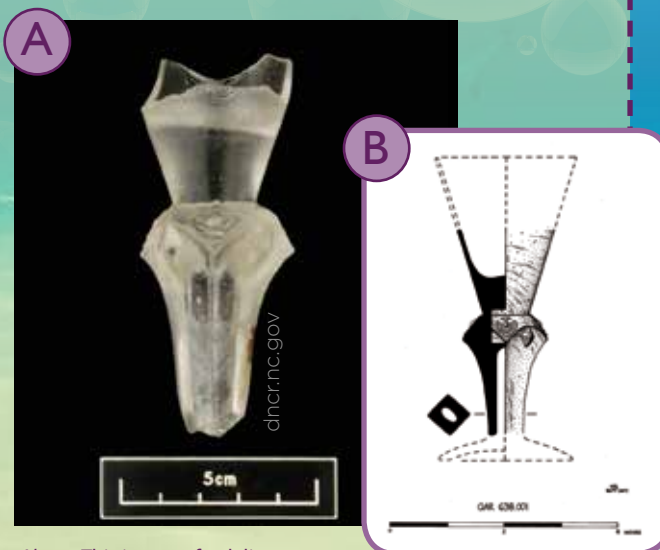
STEP 5 DOCUMENTATION

by Jeremy Borrelli

Conservators use many different skills to help preserve and interpret the past, including photography and art!

Archaeological photography provides a real representation, or visual record, of an artifact at that point in time. Several considerations influence a photographer's choices when taking artifact photos, including exposure, lighting, perspective, and lens focal length. Lighting, for example, can be altered to highlight certain markings on an artifact, like graffiti on lead cannon aprons.

QAR artifacts go through big changes from when they are fresh from the sea floor to when they're ready to be shipped to the museum. To document those changes, artifacts go through several stages of photographic documentation. Photos are first taken immediately after recovery from the site. With each additional step of treatment, new photos are taken. After conservation, artifacts are photographed on a clean background in a photography studio. In every photo, scales are placed alongside the objects as a point of reference. The photographic series of artifacts gives future archaeologists (like you!) the ability to compare images and see how an object has changed throughout the entire conservation process.



Above: This image of a delicate drinking glass fragment was taken in a photo studio. Then an artist made a technical drawing to create a more detailed record. Below left: Details on this lead cannon apron were hard to see at first. A photographer used a raking light to highlight the marks. Images courtesy of the NC Department of Natural and Cultural Resources.

Once an artifact has finished with treatment, the last step of the process is to create a technical illustration of the artifact. Why illustrate an artifact when there are so many photos of it already? Illustrations are much better at conveying an object's overall dimensions on a single image. You can take a photo of a house, but you need a blueprint to see how it's built inside and out!

By omitting certain stylistic techniques and using a variety of technical conventions, archaeological illustrations become more like interpretive diagrams than artistic or realistic portrayals of an artifact. Each form of documentation adds to the steadily growing archaeological, historical, and scientific record for QAR.

Jeremy Borrelli is an archaeologist at the QAR Lab. He has participated in several maritime archaeological projects both nationally and internationally in South Africa and Costa Rica. He joined the QAR team in 2012 and has worked in varied capacities as a lab technician and as a diver at the shipwreck site.



STEP 6 DRY STORAGE AND MUSEUM TRANSFER

by Karen Martindale

The key to preserving the finished artifacts for as long as possible is to control their storage environment, especially *humidity*—the amount of water vapor in the air.

Organic artifacts do best with a relative humidity around 50 percent, just like what you have in your house or classroom. High humidity can lead to mold growth, but low humidity can make organic artifacts brittle. Other artifacts, such as iron, need a very dry environment to prevent rust from forming, so conservators use dehumidifiers and silica gel to lower the humidity as much as possible. Temperature and humidity monitors help conservators maintain the ideal storage environment for each type of artifact.

Once all conservation and documentation is complete, the artifacts are ready to be transferred to the North Carolina Maritime Museum in Beaufort, where the curators use the artifacts to create exhibits about Blackbeard and *Queen Anne's Revenge*. They also loan artifacts to other museums, including the Museum of History in Raleigh, the Museum of the Albemarle in Elizabeth City, the Graveyard of the Atlantic Museum in Hatteras, and the Smithsonian Institution in Washington, DC.

They have even developed a traveling exhibit celebrating the 300th anniversary of Blackbeard's adventures along the North Carolina coast.

Karen Martindale is a conservator at the QAR Lab.



Storage in a dehydration box will help prevent rust on this iron cannon. Image courtesy of the NC Department of Natural and Cultural Resources.



THINK ABOUT IT

Do you think Blackbeard and his pirate crew ever thought about the year **2018** when they were roaming the seas in **1718**?

What would they think about all the work being done on the artifacts (objects) from their ship? What would they think about their "stuff" being displayed in museums?

What would they think about you dressing up like a pirate and reading all about them in this issue of *THJH* magazine?

What if pirates from 1718 could look at "artifacts" from *your* life? What would they learn about *you*?

- What has changed in 300 years?
- What has stayed the same?

Design a pirate flag!

Choose from the flag symbols below, or invent your own.



Your time is running out



A slow, painful death awaits you



We are ready to kill you



A violent death awaits you



Torment



Death



Emmanuel Wynn's "Jolly Roger" flag



Blackbeard's flag



Thomas Tew's flag

Did You Know...

Pirate flags were used to frighten sailors so they would not put up a fight

Pirates would first fly a white flag. If a merchant ship refused to yield, the pirates would switch to a red flag, meaning that once they boarded, no one would be spared

A black flag meant death, and a red flag battle. A yellow flag warned of sickness onboard

Joli rouge means "pretty red" in French. Earlier pirates used this name to jokingly describe the bloodred flag. It is also thought to be the origins for the Jolly Roger flag (the skull and crossed bones; it was the most popular pirate symbol of the 1700s).

Pirates often carried flags of several different countries in order to get closer to their victims. This practice is known as flying "false colors."

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